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# Interface Document

# for

# F/TF-15 Air Vehicle/RT-1145/ARC-164(V) UHF Receiver-Transmitter

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APPROVALS

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ENGINEERING CONTRACT SERVICES — 10/21/77 — DATE

SUBSYSTEM MANAGER — 10/31/77 — DATE

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)



LIST OF FIGURES



List Of Pages

Title Page

i - v

1 - 43

CONFIGURATION IDENTIFICATION SHEET

| NO. REQD./ASSY | DASH NO. | PART NAME |
|---|---|---|
| | | |
| | | |
| | -201 | RT-1145/ARC-164(V) UHF R/T |

| INDEX OF PAGE CHANGES | | | | | | |
|---|---|---|---|---|---|---|
| REVISION DATE AND LETTER | PAGES AFFECTED | | | REMARKS | REVISED BY | APPROVED |
| | REVISED | ADDED | REMOVED | | | |
| | | | | | | |

1. (U) SCOPE

(U) This Interface Document (ID) controls the interfaces between the RT-1145/ARC-164(V) UHF Receiver-Transmitter fabricated to specification number RWV-701 and the F/TF-15 Air Vehicle, and provides a common data base for the RT-1145/ARC-164(V) and the F/TF-15 Air Vehicle.

2. (U) APPLICABLE DOCUMENTS

(U) The revisions or issues shown below of the documented listed hereunder form a part of the ID to the extent invoked by specific reference herein. The applicable revisions or issues of subsidiary documents referenced in the military documents hereunder shall be that revision or issue in effect on 8 April 1974. In the event of conflict between the contents referenced herein and the contents of this ID the contents of this ID shall be a superseding requirement.

2.1 (U) Government documents.

SPECIFICATIONS

Military

| | |
|---|---|
| MIL-B-5087B-2 | Bonding, Electrical and Lightning Protection for Aerospace System |
| MIL-C-39012B (Supp 1A) | Connectors, Coaxial, Radio Frequency, General Specification for |
| MIL-E-5400K | Electronic Equipment, Airborne, General Specification for |
| MIL-S-7742 | Screw Threads, Standard, General Specification for |
| MIL-S-8879 | Screw Threads, Controlled Radius Root with Increased Minor Diameter, General Specification for |

STANDARDS

Military

| | |
|---|---|
| MIL-STD-461A Notices 1, 2 and 3 | Electromagnetic Interference Characteristics, Requirements for Equipment |
| MIL-STD-704A Notice 1 | Electric Power, Aircraft, Characteristics and Utilization of |

2.2 (U) Non Government documents.

MCDONNELL AIRCRAFT COMPANY SPECIFICATIONS

| | |
|---|---|
| CD76301A328A020A<br>15 December 1976 | Prime Item Development Specification for F-15 Tactical Air Superiority Fighter Air Vehicle |
| CP76301A328A083A<br>15 December 1976 | Prime Item Development Specification for F-15 Avionics Subsystem |
| PS 17169C | Bonding and Grounding to MIL-B-5087B |

2.2 (Continued)

| | |
|---|---|
| SS76301A328A001A<br>15 December 1969 | Systems Specification for Air Superiority Fighter System-328A |
| Document No. A090 (Rev A)<br>15 December 1969 | F-15 Vibration Shock and Acoustic Design Requirements and Test Procedures for Aircraft Equipment |
| H417 (Rev. D 21 June 1972) | Technical Requirements for Structural Design on F-15 Production Engineering Purchase Orders |

MAGNAVOX DOCUMENTS

| | |
|---|---|
| RWV-701<br>17 March 1976 | Prime Item Product Fabrication Specification for Receiver-Transmitter RT-1145/ARC-164(V) |

3. (U) AIR VEHICLE/ARC-164 RECEIVER-TRANSMITTER

(U) The interface between the F/TF-15 Air Vehicle and the RT-1145/ARC-164(V) UHF Receiver-Transmitter will be as defined herein.

3.1 (U) Mechanical interface. The mechanical interface between the Air Vehicle and the RT-1145/ARC-164(V) will be as shown in Figure 1. Unless otherwise specified herein, the design and construction of the equipment shall conform to MIL-E-5400 and Section 3.3 of CP76301A328A083.

3.1.1 (U) Unit requirements. The RT-1145/ARC-164 (V) outline, mounting, weight, center of gravity (CG), etc., will be in accordance with Figure 1. A CFE furnished shock mount/thermal shroud is required for the installation of the RT-1145/ARC-164(V) and is considered part of the F/TF-15 Air Vehicle.

3.1.2 (U) Screws and fasteners. Screws or fasteners which are normally removed or installed during servicing or replacing equipment on the flight line will be subject to MCAIR approval. Screws used to attach the system to the aircraft shall be size no. 10 or larger. Mounting provisions shall be designed so that no mounting screws are in bearing. The use of inserts is considered to be threads in bearing. Screw threads shall conform to MIL-S-7742 or MIL-S-8879.

3.1.3 (U) Electrical connectors. Connector type, use of potting compounds, and other physical attributes of connectors will be subject to MCAIR approval. Identical connectors will not be used on the LRU in adjacent locations unless a keying and ring assembly is provided.

3.2 (U) Electrical interface. The functional electrical interface characteristics described herein are defined in the input to the using equipment with the specified load attached.

3.2.1 (U) Interconnect wiring. The interconnect wiring will be as identified herein. Except as specifically noted herein, all interconnect wiring will be supplied by MCAIR and will be of 26 gauge high strength copper alloy (80% conductivity of pure copper) with 5 mil (FEP) fluorocarbon/polyimide insulation.

3.2.2 (U) Signal definition. The following paragraphs define the electrical signal characteristics of each interface signal.

3.2.2.1 (U) RT-1145/ARC-164 UHF Receiver Transmitter input signals. This section defines the characteristics of the input signals to the RT-1145/ARC-164(V) from the F/TF-15 interconnecting equipment.

3.2.2.1.1 (U) X-MIT AUDIO (HI)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | X-MIT AUDIO - HI<br>(Black Modulation - HI) |
| 2. | SIGNAL TYPE: | Audio |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide narrow-band modulation control to the ARC-164(V) transmitter |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-K |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | 150 Ω Transformer Output |
| | b. LOAD IMPEDANCE: | 150 Ω Differential Amplifier |
| | c. LOAD CURRENT: | 40 mA |
| | d. INPUT VOLTAGE RANGE: | 0-6.0 Vrms |
| | e. MODULATION RANGE: | 0-100% |
| | f. MODULATION CHARACTERISTICS: | 1) $\|m\| \geq 80\%$ for Vi = 1.4 Vrms @1000 Hz; -m linear function of $V_i$ for all 0 Vrms $\leq$ Vi $\leq$ 1.4 Vrms<br>2) $80\% \leq \|m\| \leq 100\%$ for 1.4 Vrms $\leq$ Vi $\leq$ 6.0 Vrms |
| | g. FREQUENCY RANGE: | 300-3500 Hz |
| | h. SHIELDING REQUIREMENTS: | Twisted, shielded-pair with X-MIT AUDIO (LO) |
| | i. RISE TIME: | N/A |
| | j. FALL TIME: | N/A |
| | k. SPECIAL REQUIREMENTS: | Modulation percentage based upon average rf carrier. With an input of 1.0 Vrms between 300 and 3500 Hz, the demodulated audio carrier voltage shall be +1 dB, -3 dB with respect to that produced by a 1.0 Vrms input voltage @ 1000 Hz. |

3.2.2.1.2 (U) X-MIT AUDIO (LO)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | X-MIT AUDIO (LO)<br>(Black modulation-return) |
| 2. | SIGNAL TYPE: | Signal Return |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide signal return for narrow-band modulation input |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-L |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | N/A |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | N/A |
| | d. INPUT VOLTAGE RANGE: | N/A |
| | e. MODULATION RANGE: | N/A |
| | f. MODULATION CHARACTERISTICS: | N/A |
| | g. FREQUENCY RANGE: | 300-3500 Hz |
| | h. SHIELDING REQUIREMENTS: | Twisted, shielded pair with X-MIT AUDIO (HI) |
| | i. RISE TIME: | N/A |
| | j. FALL TIME: | N/A |
| | k. SPECIAL REQUIREMENTS: | Returns isolated from ground. Shield tied to chassis ground at R/T. |

3.2.2.1.3 (U) CLOCK (+)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | CLOCK (+) |
| 2. | SIGNAL TYPE: | Digital gated square wave |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide serial CLOCK (+) timing to the RT-1145/ARC-164(V) for serial data synchronization. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-U |
| 7. | SIGNAL CHARACTERISTICS: | |
| a. | SOURCE IMPEDANCE: | Fairchild 9614 line driver or equivalent |
| b. | LOAD IMPEDANCE: | 200 Ω from CLOCK (+) to GND |
| c. | LOAD CURRENT: | Imax = 40 mA |
| d. | CLOCK FREQUENCY: | 620 Hz ± 20% |
| e. | SHIELDING REQUIREMENTS: | Twisted shielded pair with respect to CLOCK (-) |
| f. | RISE TIME: | ≤ 400 microseconds |
| g. | FALL TIME: | ≤ 400 microseconds |
| h. | CLOCK PHASING: | CLOCK (+) shall be 180° out of phase with respect to CLOCK (-). Data transfer shall be coincident with the negative going portion of CLOCK (+). |
| i. | LOGIC ONE (HI) LEVEL: | ≥ 2.4 VDC |
| j. | LOGIC ZERO (LO) LEVEL: | ≤ 0.8 VDC |
| k. | SPECIAL REQUIREMENTS: | The CLOCK (+) input shall consist of 32 clock periods followed by a blank period equal to 8 clock periods where CLOCK (+) is HI. Figure 2 shows typical CLOCK (+) input. |

3.2.2.1.4 (U) CLOCK (-)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | CLOCK (-) |
| 2. | SIGNAL TYPE: | Digital gated square wave |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide serial CLOCK (-) timing to the RT-1145/ARC-164(V) for serial data synchronization. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-V |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | Fairchild 9614 line driver or equivalent |
| | b. LOAD IMPEDANCE: | 200 Ω from CLOCK (-) to +5 VDC |
| | c. LOAD CURRENT: | Imax = 40 mA |
| | d. CLOCK FREQUENCY: | 620 Hz ± 20% |
| | e. SHIELDING REQUIREMENTS: | Twisted, shielded pair with respect to CLOCK (+) |
| | f. RISE TIME: | ≤ 400 microseconds |
| | g. FALL TIME: | ≤ 400 microseconds |
| | h. CLOCK PHASING: | CLOCK (-) shall be 180° out of phase with respect to CLOCK (+) |
| | i. LOGIC ONE (HI) LEVEL: | ≥ 2.4 VDC |
| | j. LOGIC ZERO (LO) LEVEL: | ≤ 0.8 VDC |
| | k. SPECIAL CONDITIONS | The CLOCK (-) input shall consist of 32 clock periods followed by a blank period equal to 8 clock periods where CLOCK (-) is LO. Figure 2 shows typical CLOCK (-) input. |

3.2.2.1.5 (U) DATA (+)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | DATA (+) |
| 2. | SIGNAL TYPE: | Serial digital bi-phase (HI/LO) |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide serial frequency selection, bandwidth and mode information to the RT-1145/ARC-164(V) from the ICCP. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-W |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | Fairchild 9614 line driver or equivalent |
| | b. LOAD IMPEDANCE: | 200Ω from DATA (+) to GND |
| | c. LOAD CURRENT: | Imax = 40 mA |
| | d. DATA BIT IDENTIFICATION: | All data bits use negative logic (LO on DATA (+) selects function) except bits 24 through 27 which are positive logic (HI on DATA (+) selects function). DATA (+) bit functions are as shown on Figure 3. |
| | e. SHIELDING REQUIREMENTS: | Twisted, shielded pair with respect to DATA (-). |
| | f. RISE TIME: | ≤ 400 microseconds |
| | g. FALL TIME: | ≤ 400 microseconds |
| | h. DATA PHASING: | DATA (+) shall be 180° out of phase with respect to DATA (-). Data transfer shall be coincident with the negative going portion of CLOCK (+). |
| | i. LOGIC ONE (HI) LEVEL: | ≥ 2.4 VDC |

3.2.2.1.5 (Continued)

| | | |
|---|---|---|
| j. | LOGIC ZERO (LO) LEVEL: | $\leq$ 0.8 VDC |
| k. | SPECIAL CONDITIONS: | One data word shall consist of 32 bits followed by a blank period equal to 8 clock periods where DATA (+) is LO. Figure 2 shows typical DATA (+) input. |

3.2.2.1.6 (U) DATA (-)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | DATA (-) |
| 2. | SIGNAL TYPE: | Serial digital bi-phase (HI/LO) |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide serial frequency selection, bandwidth and mode information to the RT-1145/ARC-164(V) from the ICCP. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-Y |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | Fairchild 9614 line driver or equivalent |
| | b. LOAD IMPEDANCE: | 200Ω from DATA (-) to +5 VDC |
| | c. LOAD CURRENT: | Imax = 40 mA |
| | d. DATA BIT IDENTIFICATION: | DATA (-) bit functions are as shown on Figure 3. |
| | e. SHIELDING REQUIREMENTS: | Twisted, shielded pair with respect to DATA (+). |
| | f. RISE TIME: | ≤ 400 microseconds |
| | g. FALL TIME: | ≤ 400 microseconds |
| | h. DATA PHASING | DATA (-) shall be 180° out of phase with respect to DATA (+). Data transfer shall be coincident with the negative going portion of CLOCK (+). |
| | i. LOGIC ONE (HI) LEVEL: | ≥ 2.4 VDC |
| | j. LOGIC ZERO (LO) LEVEL: | ≤ 0.8 VDC |
| | k. SPECIAL CONDITIONS: | One data word shall consist of 32 bits followed by a blank period equal to 8 clock periods where DATA (-) is HI. Figure 2 shows typical DATA (-) input. |

3.2.2.1.7 (U) X-MODE ENABLE

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | X-MODE ENABLE |
| 2. | SIGNAL TYPE: | Discrete Bi-Level (Open/Ground) |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provides bandwidth control for the main receiver assembly of the RT-1145/ARC-164(V). |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-G |
| | a. SOURCE IMPEDANCE: | See i. and j. below |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | $I_{max}$ = 5 mA from RT-1145/ARC-164(V) |
| | d. VOLTAGE RANGE: | Maximum open circuit voltage from the R/T shall not exceed +14 $\pm$ 2 VDC (diode isolated) |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | None |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | N/A |
| | i. X-MODE ENABLE: | GROUND: $\leq$ 2.0 VDC @ 4 mA allows the main receiver to operate in wide-band IF mode. |
| | j. X-MODE DISABLE: | OPEN: $\geq$ 50K Ω (+14 $\pm$ 2 VDC from R/T) allows main receiver to operate in narrow band IF mode. |
| | k. SPECIAL REQUIREMENTS: | Open circuit voltage from RT-1145/ ARC-164(V) diode isolated in R/T. |

3.2.2.1.8 (U) X-MIT KEY

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | X-MIT KEY |
| 2. | SIGNAL TYPE: | Discrete Bi-Level (Open/Ground) |
| 3. | SIGNAL FROM: | Throttle-grip (Aircraft key line) |
| 4. | FUNCTION: | Grounding the X-MIT KEY line causes the RT-1145/ARC-164(V) to operate in the transmit mode. **An open circuit on the X-MIT KEY line shall cause the RT-1145/ARC-164(V) to operate in the receive mode of operation.** |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-H |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. **SOURCE IMPEDANCE:** | See i. and j. |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | $I_{max}$ = 8 mA from RT-1145/ARC-164(V) |
| | d. VOLTAGE RANGE: | Maximum open circuit voltage from R/T shall be +12 VDC (diode isolated) |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | None |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | N/A |
| | i. TRANSMIT: | GROUND: $\leq$ 1.5 VDC @ 8 mA causes RT-1145/ARC-164(V) to operate in the transmit mode. |

3.2.2.1.8 (Continued)

| | |
|---|---|
| j. RECEIVE: | OPEN: ≥ 50K Ω (+12 VDC on R/T line) causes RT-1145/ARC-164(V) to operate in receive mode. Voltage transients shall be ≤ 60 VDC. |
| k. SPECIAL REQUIREMENTS: | There shall be no rf power output from the RT-1145/ARC-164(V) for a minimum of 40 milliseconds after grounding the X-MIT KEY line. RF power output shall be at least 90% of full rf power output, no less than 60 milliseconds and no greater than 80 milliseconds after grounding the X-MIT KEY line. RF power shall drop to zero not more than 1 millisecond after ungrounding the X-MIT KEY line. Open circuit voltage from RT-1145/ ARC-164(V) in Receive is diode isolated in R/T. |

3.2.2.1.9 (U) PWR ON/OFF

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | PWR ON/OFF |
| 2. | SIGNAL TYPE: | Discrete Bi-Level (Open/Ground) |
| 3. | SIGNAL FROM: | Integrated Communications, Navigation and Identification Control Panels (ICNICP) |
| 4. | FUNCTION: | Controls application of electrical power to the RT-1145/ARC-164(V) Receiver Transmitter. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-H |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | See i. and j. below |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | $I_{max}$ = 10 mA from RT-1145/ARC-164(V) |
| | d. VOLTAGE RANGE: | Maximum open circuit voltage from R/T shall be +28 VDC. |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | None |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | |
| | i. POWER ON: | GROUND: $\leq$ 1.5 VDC @ 5 mA applies +28 VDC power to the RT-1145/ ARC-164(V). |
| | j. POWER OFF: | OPEN: $\geq$ 50K Ω (+28 VDC from R/T) turns the RT-1145/ARC-164(V) off. |
| | k. SPECIAL REQUIREMENTS: | Open circuit voltage from RT-1145/ ARC-164(V) with Power OFF is diode isolated in R/T. |

3.2.2.1.10 (U) GUARD ON/OFF

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | GUARD ON/OFF |
| 2. | SIGNAL TYPE: | Discrete Bi-Level (Open/Ground) |
| 3. | SIGNAL FROM: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Grounding the GUARD ON/OFF line turns on the auxiliary guard receiver in the RT-1145/ARC-164(V). |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-Z |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | See i. and j. below |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | $I_{max}$ = 10 mA from RT-1145/ARC-164(V) |
| | d. VOLTAGE RANGE: | Maximum open circuit voltage from R/T shall be +12 VDC (diode isolated). |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | None |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | N/A |
| | i. GUARD ON: | GROUND: $\leq$ 2.0 VDC @ 3 mA turns the auxiliary guard receiver on. |
| | j. GUARD OFF: | OPEN: $\geq$ 50K Ω (+12 VDC from R/T) turns the auxiliary guard receiver off. |
| | k. SPECIAL CONDITIONS: | Open circuit voltage from RT-1145/ ARC-164(V) with GUARD OFF is diode isolated in R/T. |

3.2.2.1.11 (U) PRIMARY PWR IN

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | PRIMARY PWR IN |
| 2. | SIGNAL TYPE: | +28 VDC |
| 3. | SIGNAL FROM: | F/TF-15 Air Vehicle Essential/Main Buss Circuit Breaker. |
| 4. | FUNCTION: | Provides DC power to operate the RT-1145/ARC-164(V) Receiver Transmitter. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-D |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. VOLTAGE RANGE: | 20-30 VDC |
| | b. LOAD CURRENT: | 5.35 A max |

NOTE: 28 VDC power shall meet the requirements of MIL-STD-704A for Category B equipment.

3.2.2.1.12 (U) PRIMARY PWR RTN

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | PRIMARY PWR RTN |
| 2. | SIGNAL TYPE: | DC Power Return |
| 3. | SIGNAL FROM: | F/TF-15 Chassis ground |
| 4. | FUNCTION: | Provide ground return for +28 VDC PRIMARY POWER to RT-1145/ARC-164(V). |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164 (V) CONNECTOR/PIN ASSIGNMENT: | J1-E |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. GROUND: | $\leq$ 0.1 Ω |
| | b. SPECIAL REQUIREMENTS: | See Para. 3.5.1.1 for primary power grounding requirements. |

3.2.2.1.13 (U) SIGNAL GROUND

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | SIGNAL GND |
| 2. | SIGNAL TYPE: | Wideband Audio return |
| 3. | SIGNAL FROM: | Integrated Communication Control Panel (ICCP) and F/TF-15 Chassis Ground. |
| 4. | FUNCTION: | Provide wideband audio return (i.e. see Para. 3.2.2.2.3) from ICCP to the RT-1145/ARC-164(V). |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-A |
| | a. INPUT IMPEDANCE: | $\leq$ 0.1 Ω |
| | b. SHIELDING REQUIREMENTS: | Twisted shielded pair with X-MODE RCV AUDO (See Para. 3.2.2.2.3). Tied to PRIMARY PWR RTN (See Para. 3.2.2.1.12) and F/TF-15 chassis ground external to RT-1145/ ARC-164(V). |

3.2.2.1.14 (U) X-MODE XMIT AUDIO

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | X-MODE XMIT AUDIO |
| 2. | SIGNAL TYPE: | Audio |
| 3. | SIGNAL FROM: | TSEC/KY-28 |
| 4. | FUNCTION: | Provide wideband modulation to the RT-1145/ARC-164(V) from the KY-28 secure speech equipment. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN: ASSIGNMENT | J1-J |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | 600 Ω resistive |
| | b. LOAD IMPEDANCE: | 600 Ω ± 20% resistive |
| | c. LOAD CURRENT: | Imax = 10 mA |
| | d. INPUT VOLTAGE RANGE: | 12 ± 1 Vp-p (i.e. 3.89 - 4.60 Vrms) |
| | e. MODULATION RANGE: | 0-100% |
| | f. MODULATION CHARACTERISTICS: | 1-10 Vp-p shall provide at least m = +80% @ 1000 Hz. An input 6dB above that required for m = +80% @ 1000 Hz shall result in m ≤ -100%. |
| | g. FREQUENCY RANGE: | 70 - 25,000 Hz @ 18,750 Bit/sec rate. |
| | h. SHIELDING REQUIREMENTS: | Shielded single conductor. |
| | i. RISE TIME: | N/A |
| | j. FALL TIME: | N/A |
| | k. SPECIAL REQUIREMENTS: | None |

3.2.2.2 (U) RT-1145/ARC-164(V) UHF Receiver Transmitter Output Signals. This section defines the characteristics of the output signals of the RT-1145/ARC-164(V) to the F/TF-15 interconnecting equipment.

3.2.2.2.1 (U) RCV AUDIO (HI)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | RCV AUDIO (HI) (Narrowband audio) |
| 2. | SIGNAL TYPE: | AUDIO |
| 3. | SIGNAL TO: | Integrated Communication Control Panel (ICCP) |
| 4. | FUNCTION: | Provide 150 Ω or 600 Ω (300-3500 Hz) narrowband audio output from the RT-1145/ARC-164(V) |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1154/ARC-164(V) CONNECTOR/PIN ASSIGNMENT | J1-X |
| 7. | SIGNAL CHARACTERISTICS | |
| a. | SOURCE IMPEDANCE (ARC-164): | 150 Ω /600 Ω (300-3500 Hz) Resistive |
| b. | LOAD IMPEDANCE: | 150 Ω /300 Ω (300-3000 Hz) isolation transformer in ICCP |
| c. | LOAD CURRENT: | $I_{max}$ = 50 mA |
| d. | VOLTAGE RANGE: | 5.47 to 7.34 Vrms across 150 Ω (i.e. audio power between .200 and .360 watts) with 1000 μ volt rf Input (open circuit) M=90% @ 1000 Hz. |
| e. | FREQUENCY RANGE: | 300-3500 Hz |
| f. | SHIELDING REQUIREMENTS: | Twisted, shielded pair with RCV AUDIO (LO). Signal isolated at R/T. |
| g. | RISE TIME: | N/A |
| h. | FALL TIME: | N/A |
| i. | AUDIO RESPONSE: | Narrowband audio output shall be as in d. above. The audio response between 300 to 3500 Hz shall be within +1dB, -3dB with respect to the reference level at 1000 Hz. Above 3500 Hz, the audio output roll-off shall be 6dB per octave or greater. |
| j. | SPECIAL REQUIREMENTS: | The audio output shall be ungrounded. Shield tied to chassis ground at R/T. |

3.2.2.2.2 (U) Narrowband Audio (LO)

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | RCV AUDIO (LO) |
| 2. | SIGNAL TYPE: | AUDIO |
| 3. | SIGNAL TO: | Integrated Communications Control Panel (ICCP) |
| 4. | FUNCTION: | Provide 150 Ω or 600 Ω (300-3500 Hz) narrowband audio return from ICCP |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-E |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | N/A |
| | b. LOAD IMPEDANCE: | N/A |
| | c. LOAD CURRENT: | N/A |
| | d. VOLTAGE RANGE: | N/A |
| | e. FREQUENCY RANGE: | 300-3500 Hz |
| | f. SHIELDING REQUIREMENTS: | Twisted Shielded pair with RCV AUDIO (HI). Signal isolated at R/T |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | N/A |
| | i. AUDIO CHARACTERISTICS: | See 3.2.2.2.1 |
| | j. SPECIAL REQUIREMENTS: | Shield tied to chassis ground at R/T |

3.2.2.2.3 (U) X-MODE (WIDEBAND) RCV AUDIO (HI)

| | |
|---|---|
| 1. SIGNAL TITLE: | X-MODE RCV AUDIO (HI) |
| 2. SIGNAL TYPE: | AUDIO |
| 3. SIGNAL TO: | Integrated Communication Control Panel (ICCP) |
| 4. FUNCTION: | Provide 500 Ω (70-25,000 Hz) audio output from the RT-1145/ARC-164(V) |
| 5. NUMBER OF WIRES: | 1 |
| 6. RT-1145/ARC-164 CONNECTOR/PIN: ASSIGNMENT | J1-C |
| 7. SIGNAL CHARACTERISTICS: | |
| a. SOURCE IMPEDANCE (ARC-164): | 500 Ω Resistive |
| b. LOAD IMPEDANCE | 10 K Ω in ICCP |
| c. LOAD CURRENT: | |
| d. VOLTAGE RANGE: | ≥ 2.75 Vrms across 10 K Ω with an rf input of 1000 μ volts (open circuit) m=90% @ 1000 Hz |
| e. FREQUENCY RANGE: | 70-25,000 Hz |
| f. SHIELDING REQUIREMENTS: | Twisted shielded pair with return line. Return and shield tied to ground at chassis. |
| g. RISE TIME: | N/A |
| h. FALL TIME: | N/A |
| i. AUDIO RESPONSE: | The wideband audio output shall be ± 3 dB between 70 Hz and 20 kHz and +3 dB, -5 dB between 20 kHz and 25 kHz with respect to the reference at 1000 Hz. The audio output from the R/T shall be ahead of the squelch circuit. |

3.2.2.2.3 (Continued)

| | |
|---|---|
| j. SPECIAL REQUIREMENTS: | The time delay through the RT-1145/ ARC-164(V) (from rf antenna input to wideband audio output) shall be be-between 18 and 42 μsec. Measurement of the delay shall be made with respect to the negative going portion of the rf signal envelope. The wideband audio return from the ICCP shall be chassis ground at the R/T. |

3.2.2.2.4 (U) MAIN SQUELCH OUT

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | MAIN SQUELCH OUT |
| 2. | SIGNAL TYPE: | Discrete Bi-Level (Open/Ground) |
| 3. | SIGNAL TO: | 3-port Antenna Selector |
| 4. | FUNCTION: | Provide an indication to the 3-port Antenna Selector that main receiver squelch of the RT-1145/ARC-164(V) has been activated. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-A |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | UNSQUELCHED (i.e. AUDIO OUT): $\leq$ 0.5 VDC @ 50 mA<br>SQUELCHED (i.e. NO AUDIO OUT): $\geq$ 50 K $\Omega$ |
| | b. LOAD IMPEDANCE: | 600 $\Omega$ |
| | c. LOAD CURRENT: | $I_{max}$=50 mA (max. current sink of R/T) |
| | d. VOLTAGE RANGE: | 0-30 VDC |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | NONE |
| | g. ATTACK TIME: | $\leq$ 50 milliseconds |
| | h. RELEASE TIME: | $\leq$ 150 milliseconds |
| | i. R/T UNSQUELCHED (i.e. AUDIO OUT): | GROUND: RT-1145/ARC-164(V) shall provide a ground capable of handling at least 50 mA @ $\leq$ 0.5 VDC. |
| | j. R/T SQUELCHED (i.e. NO AUDIO OUT): | OPEN: $\geq$ 50 K $\Omega$ |
| | k. SPECIAL REQUIREMENTS: | Voltage transients per MIL-STD-704A |

3.2.2.2.5 (U) SWITCHED 28 VDC OUT

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | Switched +28 VDC output |
| 2. | SIGNAL TYPE: | +27.5 VDC |
| 3. | SIGNAL TO: | **antenna selector** |
| 4. | FUNCTION: | Provides switched +27.5 VDC output to the **antenna selector after RT-1145/ARC-164(V) primary power is turned on.** |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-N |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. **SOURCE IMPEDANCE:** | N/A |
| | b. LOAD IMPEDANCE: | +27.5 VDC @ 1A |
| | c. LOAD CURRENT: | $I_{max}$ = 1 Ampere |
| | d. VOLTAGE RANGE: | 0-27.5 VDC (Transients per MIL-STD-704A) |
| | e. FREQUENCY RANGE: | DC |
| | f. SHIELDING REQUIREMENTS: | NONE |
| | g. RISE TIME: | $\leq$ 5 milliseconds |
| | h. FALL TIME: | $\leq$ 1 milliseconds |
| | i. SWITCHED +27.5 DC OUT: | Grounding the POWER ON/OFF line (see Para. 3.2.2.1.9) shall provide +27.5 VDC output within 5 msec after the ground is applied. |
| | j. NO SWITCHED +27.5 VDC OUT: | Ungrounding the POWER ON/OFF line (see Para. 3.2.2.1.9) shall drop +27.5 VDC to 0 VDC within 1 msec after the ground is removed. |
| | k. SPECIAL REQUIREMENTS: | Voltage Transients shall be per MIL-STD-704A |

3.2.2.2.6 (U) GUARD AUDIO

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | GUARD AUDIO |
| 2. | SIGNAL TYPE: | AUDIO |
| 3. | SIGNAL TO: | TSEC/KY-28 |
| 4. | FUNCTION: | Provides amplitude moldulated wide-band (18,750 bit/sec) audio output to the TSEC/KY-28 secure speech equipment. |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | RT-1145/ARC-164(V) CONNECTOR/PIN ASSIGNMENT: | J1-B |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. SOURCE IMPEDANCE: | 600 Ω ± 20% Resistive |
| | b. LOAD IMPEDANCE: | 600 Ω Resistive |
| | c. LOAD CURRENT: | |
| | d. VOLTAGE RANGE: | ≥ 2.00 Vrms across 600 Ω with an rf input of 1000μ volts (open circuit) M=90% @ 1000 Hz. |
| | e. FREQUENCY RANGE: | 70-25,000 Hz @ 18,750 bit/sec rate |
| | f. SHIELDING REQUIREMENTS: | Shielded single conductor. |
| | g. RISE TIME: | N/A |
| | h. FALL TIME: | N/A |
| | i. AUDIO RESPONSE: | Audio output between 70 Hz and 20 kHz shall be ± 3dB with respect to the reference at 1000 Hz. The audio output between 20 kHz and 25 kHz shall be +3dB, -5dB with respect to the reference at 1000 Hz. |
| | j. SPECIAL REQUIREMENTS: | NONE |

3.2.2.3 (U) RT-1145/ARC-164(V) RF interfaces. This section defines the ARC-164(V) interfaces that consists of RF input and output signals that use the same transmission line.

3.2.2.3.1 (U) Upper/Lower antenna input/output

| | | |
|---|---|---|
| 1. | SIGNAL TITLE: | Upper/Lower Antenna Input/Output |
| 2. | SIGNAL TYPE: | Radio Frequency (RF) |
| 3. | SIGNAL TO/FROM: | Upper/Lower UHF/L-Band Antenna |
| 4. | FUNCTION: | Transmit UHF replies and receive UHF transmissions |
| 5. | NUMBER OF WIRES: | 1 |
| 6. | CONNECTOR: | J2 |
| 7. | SIGNAL CHARACTERISTICS: | |
| | a. IMPEDANCE: | 52 ohms |
| | b. FREQUENCY RANGE: | 225.000 to 399.975 MHz |
| | c. POWER OUTPUT (ARC-164) | ≥ 10 watts |
| | d. INPUT VOLTAGE (RANGE) | 0-1.5 Vrms (open circuit) |
| | e. VSWR | 2.5:1.0 Max. |
| | f. SPECIAL REQUIREMENTS: | Coaxial cable |

3.2.2.4 (U) RT-1145/ARC-164(V) Unused signals - The signals listed below and corresponding connector/pin assignments are not used in the F/TF-15 interface.

| SIGNAL NAME | CONNECTOR/PIN | |
|---|---|---|
| SPARE | J1-J | |
| SPARE | J1-B | |
| TONE KEY | J1-E | |
| MAIN AGC | J1-F | |
| GUARD AGC | J1-G | |
| 600Ω XMIT AUDIO IN | J1-M | |
| SPARE | J1-P | |
| RETRANSMIT AUDIO IN | J1-R | |
| SPARE | J1-T | |
| SPARE | J1-D | |
| SPARE | J1-C | |
| CARBON MIC. INPUT | J1-S | |
| GROUND | J3-1 | TEST CONNECTOR |
| XMIT KEY | J3-2 | |
| RCV AUDIO LO | J3-3 | |
| RCV AUDIO HI | J3-4 | |
| SPARE | J3-5 | |
| +27.5VDC | J3-6 | |
| SPARE | J3-7 | |
| SHIELD GROUND | J3-8 | |
| XMIT AUDIO LO | J3-9 | |
| XMIT AUDIO HI | J3-10 | |
| SPARE | J3-11 | |
| SPARE | J3-12 | |
| SPARE | J3-13 | |

3.3 (U) Cooling. The cooling interface for the F/TF-15 Air Vehicle/ARC-164 UHF R/T will consist of the following RT-1145/ARC-164(V) heat dissipations.

3.3.1 (U) Heat dissipation. The heat dissipation of the RT-1145/ARC-164(V) shall not exceed 150 watts.

3.3.2 (U) Forced air cooling. Forced air cooling is available for the RT-1145/ARC-164(V) as follows:

Humidity. The humidity of the forced cooling air supplied will not exceed 100% relative humidity and will not contain free moisture. In all cases except during transient flight operation, the cooling air temperature/humidity conditions will not be such as to result in condensation within the equipment due to rapid cooling air temperature changes.

Cooling Air Temperature (Continuous operation). The temperature of the cooling air will be as follows:

| | |
|---|---|
| Normal Flight Operation | 50°F to 85°F |
| Aircraft Static Operation | 50°F to 105°F |
| Ground Check-Out Operation | -65°F to 105°F |

Cooling Air Flowrate (Continuous operation). The flowrate of the cooling air will be as follows:

| Nominal Design Flowrate | Minimum Design Flowrate |
|---|---|
| 0.21 lb/min @ -65°F | 0.20 lb/min @ -65°F |
| 0.22 lb/min @ -20°F | 0.20 lb/min @ -20°F |
| 0.40 lb/min @ 50°F | 0.32 lb/min @ 50°F |
| 0.65 lb/min @ 85°F | 0.47 lb/min @ 85°F |
| 1.01 lb/min @ 105°F | 0.65 lb/min @ 105°F |

The R/T shall operate satisfactorily with forced air as specified above over the applicable temperature-altitude range required herein. The R/T shall operate satisfactorily with cooling airflows up to 1.01 lb/min at any of the above cooling air temperatures. During normal flight operation, cooling air will be controlled to 85°F at altitudes below 34,000 feet and 50°F at higher altitudes.

Transient Flight Operation. During transient flight operation the following cooling air flowrates will be supplied:

| Temperature | Flowrate |
|---|---|
| -65°F to 135°F | 0.20 lb/min @ -65°F |
| | 0.20 lb/min @ 0°F |
| | 0.30 lb/min @ 85°F |
| | 0.52 lb/min @ 135°F |

The R/T shall be capable of satisfactory performance, with some degradation in life allowed, while being supplied with the above cooling airflow rates for durations up to 30 minutes. Conditions prior to these operating conditions shall be based on stabilized normal flight operation (cooling air per "Minimum Design Flowrate" as specified above).

3.3.2.1 R/T operation with no cooling air. The R/T shall operate continuously with a 5 minute receive - one minute transmit duty cycle, with no cooling air in an ambient temperature of 60°C and an altitude of 12,000 feet.

3.3.2.2 Thermal protection. The receiver-transmitter shall be protected against overheating. If the receiver-transmitter is operated without sufficient cooling, no damage shall occur.

3.3.3 (U) Pressurization. The equipment will not be pressurized.

3.4 (U) Pilot interface.

3.4.1 (U) Controls. Not applicable to the RT-1145/ARC-164(V).

3.4.2 (U) Display. Not applicable to the RT-1145/ARC-164(V).

3.5 (U) Electromagnetic compatibility. The electromagnetic compatibility interface consists of those features of the RT-1145/ARC-164(V) and the F/TF-15 Air Vehicle designed to minimize detrimental effects of electromagnetic fields and/or radiation. The RT-1145/ARC-164(V) shall be designed to and comply with the requirements of MIL-STD-461 Class 1A as defined in Paragraph 3.3.2.2 of System Specification SS76301A328A001 except that the 1 volt/meter requirement of RS03 is changed to 5 volts/meter except at the channel frequency which shall remain at 1 volt/meter. Also excepted are tests CE04, CE06 and RE02 where the following deviations to MIL-STD-461 specification limits shall apply.

CE04: Connect a line from the Notice 3 broadband spec limit at 0.7 MHz to 96 dBμA/MHz at 0.8 MHz and from there back to the spec limit at 0.9 MHz. This change is applicable only for transients.

CE06: Connect a line from 67 dBμv/MHz at 10 KHz to 52 dBμv/MHz at 25 KHz and from that point to the original spec. limit for transmitters (key-up) at 25 KHz. This is for steady state. For the transient limit, a line should be drawn from 90 dBμv/MHz at 10 KHz to the original spec. limit at 0.8 MHz.

RE02: Narrowband limit. A line should be drawn from the original limit at 40 KHz to 48 dBμv/M at 45 KHz and from there back to the original limit at 50 KHz.

AFCS Design Handbook 1-4 Electromagnetic Compatibility shall be used as a design guide.

3.5.1 (U) Grounding characteristics. The RT-1145/ARC-164(V) will be grounded in a manner which will prevent ground loops and ground returns common to signal and power circuits, and will provide effective shielding for signal circuits, minimize EMI, and protect personnel from electrical hazards. To provide grounding consistency the following items shall apply.

3.5.1.1 (U) Primary power grounding. For grounding purposes, primary power is defined as electrical power which is conducted from aircraft generators or power supplies. Raw primary power is defined to include aircraft bus power which is fused or switched, and attenuated primary power is defined to include aircraft bus power which is filtered, regulated or otherwise attenuated.

3.5.1.2 (U) Secondary power and signal grounding. Secondary power is defined as electrical power, which is isolated from primary power by a transformer. A signal is defined as electrical energy which contains information.

(U) To ensure adequate rejection of aircraft chassis noise, the secondary power and signals conducted from one LRU to another shall not utilize aircraft structure as a return or the loads shall be balanced with respect to aircraft chassis such that equipment performance will not be degraded by the noise listed below. As a minimum, all signal loads, excluding discretes, shall be balanced within 95 percent. Discrete signals (non-digital two-state signals) may use aircraft structure return provided that they are thresholded to function properly when subjected to the noise listed below. A signal source may be unbalanced provided that it is of sufficiently low impedance to avoid unbalancing the circuit beyond the noise tolerance limits listed below. Otherwise the source must be balanced. If an existing signal load is unbalanced, then the signal source must be isolated from aircraft chassis by an impedance that is large enough to ensure performance under the conditions listed below.

(U) All interface circuits shall be capable of specified performance when subjected to the aircraft chassis noise existing between the two LRU's as specified below:

a. 2 Volts rms from 380 Hz and their harmonics up to the tenth.
b. 1 Volt rms from dc to 100 MHz.
c. 8 Volts, 100 μsec pulses of a repetition rate of 100 Hz to 200 Hz

(U) Signal and secondary power circuits between LRU's may share return wires with other circuits only where approved by MCAIR. Analog video and other wideband analog (non-digital) signals conducted from one LRU to another and with information frequency content above 1 MHz shall be conducted between line-replaceable units on triax or twinax with corresponding triax or twinax connectors and the signal shall be terminated in a balanced load, which matches the characteristic impedance of the line.

(U) RF or IF carriers above 1 MHz which are conducted to antennas or to receivers with a skirt selectivity of at least 80 dB one decade out of band may be referenced to chassis at each end and may be impedance matched to the transmission line.

3.5.1.3 (U) Shield grounding. The connector pins shall be grounded to the equipment chassis by the shortest means practicable.

3.5.1.4 (U) Chassis ground. For safety purposes one internally grounded pin shall be provided on each connector containing pins for primary power.

3.5.1.5 (U) Component grounds. All externally exposed metal parts, shields, control shafts, switch handles, connectors and bushings shall be grounded to the chassis.

3.5.1.6 (U) Bonding. The means of electrically bonding the equipment to the aircraft chassis shall be considered an interface with the aircraft. The design must have MCAIR approval and must comply with the requirements of MIL-B-5087 and MCAIR Process Specification 17169. Reference Figure 1 for mounting interface bonding requirements.

3.5.2 (U) RF transmitter/receiver compatibility. The RT-1145/ARC-164(V) receiver/transmitter must be compatible with other RF transmitters on board the F/TF-15 air vehicle.

3.6 (U) Environmental conditions. The equipment shall meet all specified operating requirements and shall provide required performance, life and reliability when operated within the airframe and subsystem flight envelope given in Figure 17 of CP76301A328A020A.

3.6.1 (U) Nuclear survivability. Deleted.

3.6.2 (U) Shock. Service shock and crash safety shock of Document No. A090 are applicable.

3.6.3 (U) Design loads. The item when installed in the aircraft shall be designed in accordance with the following loads criteria. Limit loads are defined as those loads that are actually expected to be experienced when operating within the performance envelope of the aircraft. Limit and ultimate load tests are necessary to demonstrate the structural integrity of the equipment mounting. The mounting hardware shall be the same as used in the aircraft. For ultimate load tests, the mounting system and the unit case shall be complete, but internal components in the case may be simulated by mass items giving the same weight and center of gravity as the equipment.

3.6.3.1 (U) Limit Load Factors. The equipment when installed in the aircraft as shown in Figure 1 shall be designed to have no distortion or permanent set and shall meet all specified operating and performance requirements when the following Limit Load Factors are applied.

| | Limit Load Factors (G's) | | |
|---|---|---|---|
| | (*) | (**) | (***) |
| Condition | Vertical | Longitudinal | Lateral |
| A | +14.7 | 0 | 0 |
| B | +11.5 | 0 | +2.7 |
| C | + 3.7 | -8.6 | 0 |

(*) Forces from (+) vertical load factors act down.
(**) Forces from (+) longitudinal load factors act aft.
(***) Forces from (+) lateral load factors act toward left side.

3.6.3.2 (U) Ultimate loads. Ultimate loads are 1.5 times limit loads. There shall be no structural failures when the item is subjected to ultimate loads. However, distortion and permanent set are permissible after the application of ultimate loads. Operation of the item is not required during or after the application of ultimate loads.

3.6.3.3 (U) Crash loads. Not applicable.

3.6.4 (U) Vibration. Random vibration conditions of Document No. A090 are applicable.

3.6.5 (U) Acoustic noise. Acoustic noise conditions of Document No. A090 are applicable.

3.6.6 (U) Temperature-altitude. Temperature-altitude conditions of 3.2.5.1 of CP76301A328A083 and shown in Figure 4 for continuous and transient operation are applicable.

3.6.7 (U) Explosive atmosphere. The requirements of 3.2.24.10 of MIL-E-5400 are applicable.

3.6.8 (U) Humidity. The requirements of 3.2.24.4 of MIL-E-5400 are applicable.

3.6.9 (U) Salt atmosphere. The requirements of 3.2.24.9 of MIL-E-5400 are applicable.

3.6.10 (U) Fungus. The requirements of 3.2.24.8 of MIL-E-5400 are applicable.

3.6.11 (U) Sand and dust. The requirements of 3.2.4.7 of MIL-E-5400 are applicable.

3.6.12 (U) Aircraft Maneuvers.

3.6.12.1 (U) Average aircraft maneuvers. System performance shall not be degraded by aircraft maneuvers up to the following normal limits.

a. Aircraft Angular Rates

Pitch: 30° per second
Roll: 200° per second
Yaw: 30° per second

b. Aircraft Angular Acceleration

Pitch: 50° per second per second
Roll: 300° per second per second
Yaw: 60° per second per second

3.6.12.2 (U) Maximum aircraft maneuvers. The equipment shall not be damaged by aircraft maneuvers up to the following limits.

a. Aircraft Angular Rates

Pitch: 69° per second
Roll: 287° per second
Yaw: 201° per second

b. Aircraft Attitude

Pitch: 201° per second per second
Roll: 1031° per second per second
Yaw: 201° per second per second.

c. Aircraft Attitude

Pitch ± 180°
Roll ± 360°

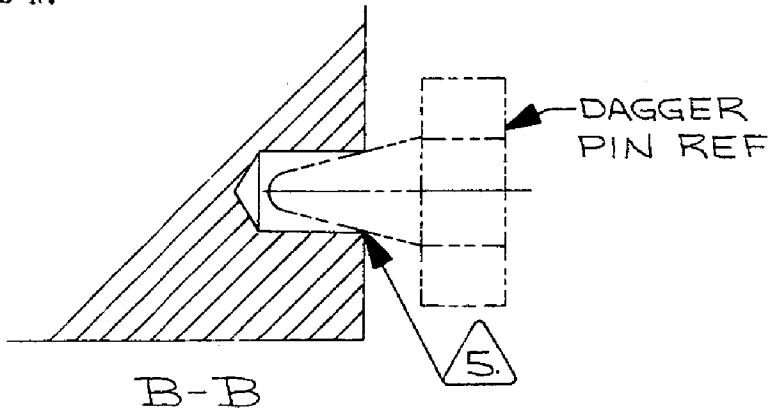
3.7 (U) Design and Construction. Design and construction of the equipment shall conform with Paragraph 3.2 of MIL-E-5400 and MCAIR Report H417.

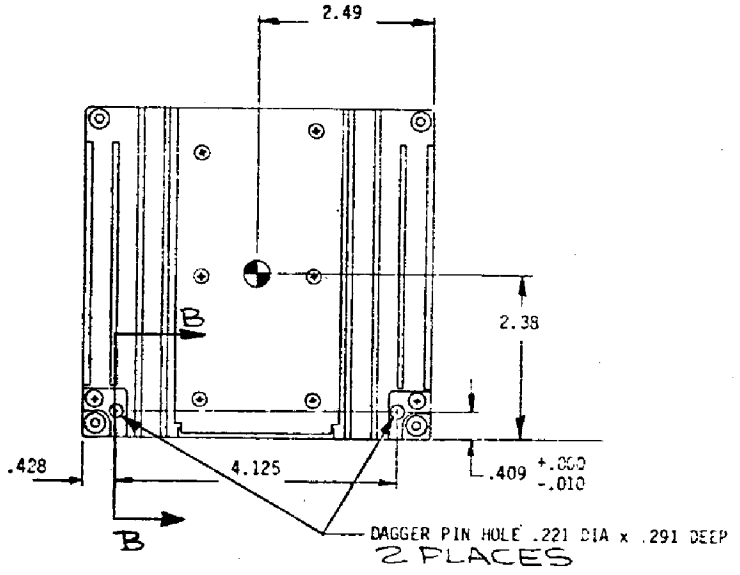
3.7.1 (U) Strength. The equipment shall be designed in accordance with the strength requirements of MCAIR Report H417 and shall be capable of withstanding the loads and environments in this document.

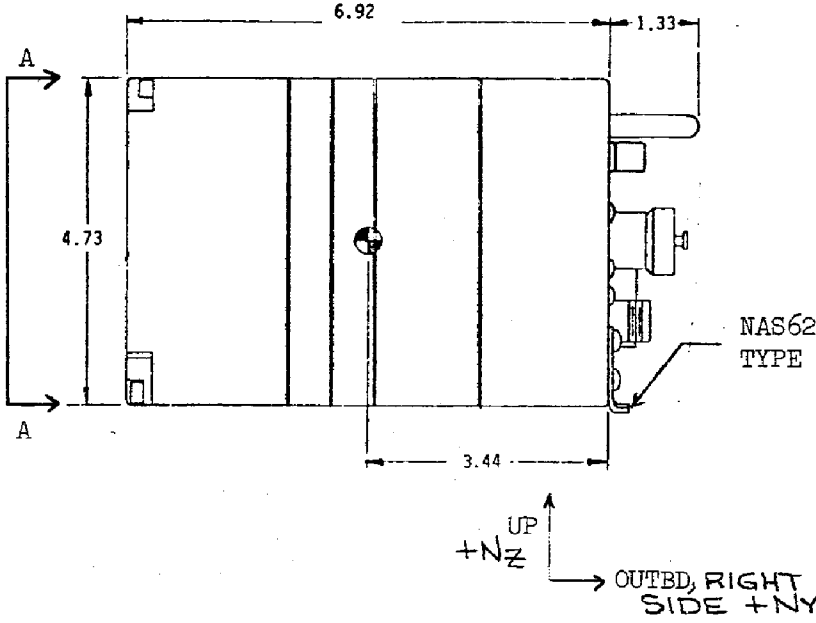
3.7.2 (U) Fatigue design consideration. All elements of detail design shall be properly considered in accordance with MCAIR Report H417 in order to insure maximum fatigue life.

3.7.3 (U) Materials, processes and parts. Materials, processes, and parts shall meet requirements of Section 3.1 of MIL-E-5400 and MCAIR Report H417.

1. Tolerances unless otherwise specified:
   .XX ± .03  .XXX ± .010
2. ⊕ Denotes approximate center of gravity
3. Unit Weight: 8.5 Pounds Max.
4. Pinhole shall be electrically clean and compatible with stainless steel.
5. Bonding shall be per MIL-B-5087B Class R.



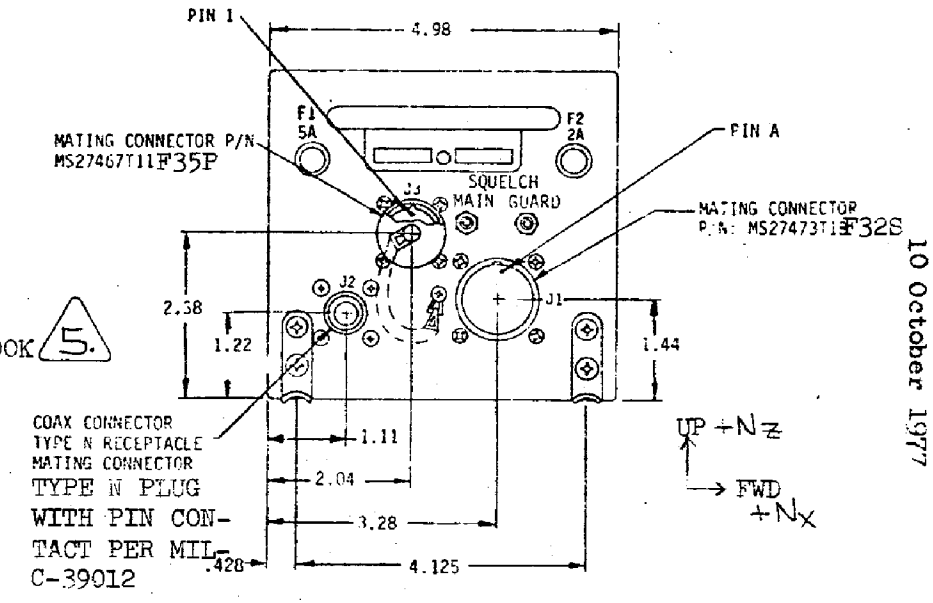
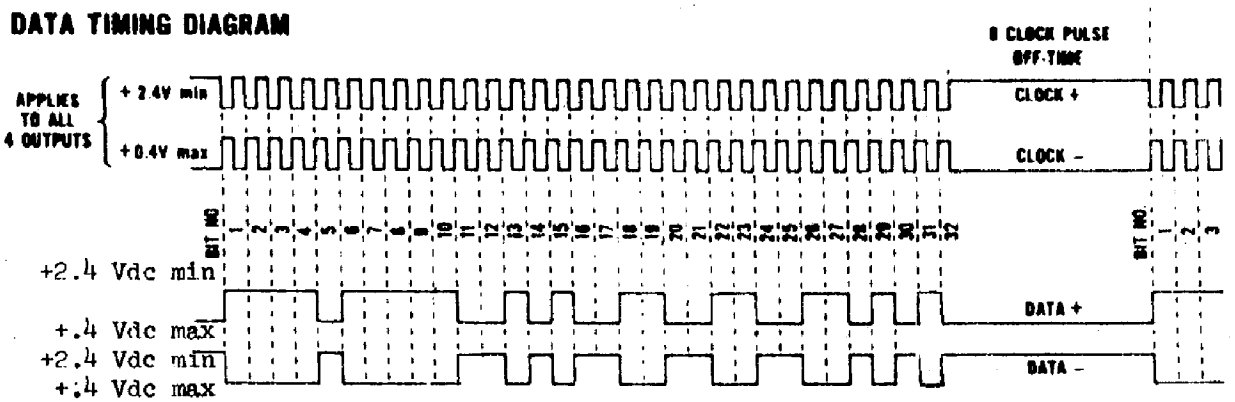




Figure 1 RT-1145/ARC-164(V) Receiver Transmitter

## DATA TIMING DIAGRAM




**NOTES:**

1. Data bits change on negative-going edges of clock + output.
2. Bit 1 is first bit out of register.
3. Clock frequency = 620 Hz ±20%
4. Conditions described by data bits.
   (A) Manual Mode
   (B) Chan. Sel. Switch at Chan. 5
   (C) Operating Frequency - 299.975 MHz
   (D) W/N Switch in NB
   (W/N Input HI, Logic 1)
   (E) SQ Disable Switch in off
   (Sq. Dis. Input LO, Logic 0)

SERIAL DATA BIT INFORMATION

| BIT No. | FUNCTION | DATA & OUTPUT DESCRIPTION | BIT No. | FUNCTION | DATA & OUTPUT DESCRIPTION |
|---|---|---|---|---|---|
| 1 | Chan. Sel. 1 | 0 For Chan 1/11, 1 For All Other | 17 | 40 MHz | POSITIVE LOGIC BCD |
| 2 | Chan. Sel 2 | 0 For Chan 2/12, 1 For All Other | 18 | 80 MHz | |
| 3 | Chan. Sel. 3 | 0 Ppr Chan 3/13, 1 For All Other | 19 | 1 MHz | POSITIVE LOGIC BCD |
| 4 | Chan. Sel. 4 | 0 For Chan 4/14, 1 For All Other | 20 | 2 MHz | |
| 5 | Chan. Sel. 5 | 0 For Chan 5/15, 1 For All Other | 21 | 4 MHz | |
| 6 | Chan. Sel. 6 | 0 For Chan 6/16, 1 For All Other | 22 | 8 MHz | |
| 7 | Chan. Sel. 7 | 0 For Chan 7/17, 1 For All Other | 23 | 0.1 MHz | POSITIVE LOGIC BCD |
| 8 | Chan. Sel. 8 | 0 For Chan 8/18, 1 For All Other | 24 | 0.2 MHz | |
| 9 | Chan. Sel. 9 | 0 For Chan 9/19, 1 For All Other | 25 | 0.4 MHz | |
| 10 | Chan. Sel. 10 | 0 For Chan 10/20, 1 For All Other | 26 | 0.8 MHz | |
| 11 | Chan. Sel. 11 | 0 For Chan 1-9 and 20, 1 For Chan 10-19 | 27 | 0.05 MHz | 0 for .000 and .025; 1 for .050 and .075 |
| 12 | MPG Manual | 0 In Manual, 1 in Preset and Guard | 28 | 0.025 MHz | 1 for .000 and .050; 0 for .025 and .075 |
| 13 | MPG Guard | 0 In Guard, 1 in Manual and Preset | 29 | WB/NB | 0 for WB, 1 for NB |
| 14 | 200/300 MHz | 0 For 200, 1 for 300 | 30 | Squelch Disable | 0 for Disable |
| 15 | 10 MHz | POSITIVE LOGIC BCD | 31 | Spare | |
| 16 | 20 MHz | | 32 | Spare | |

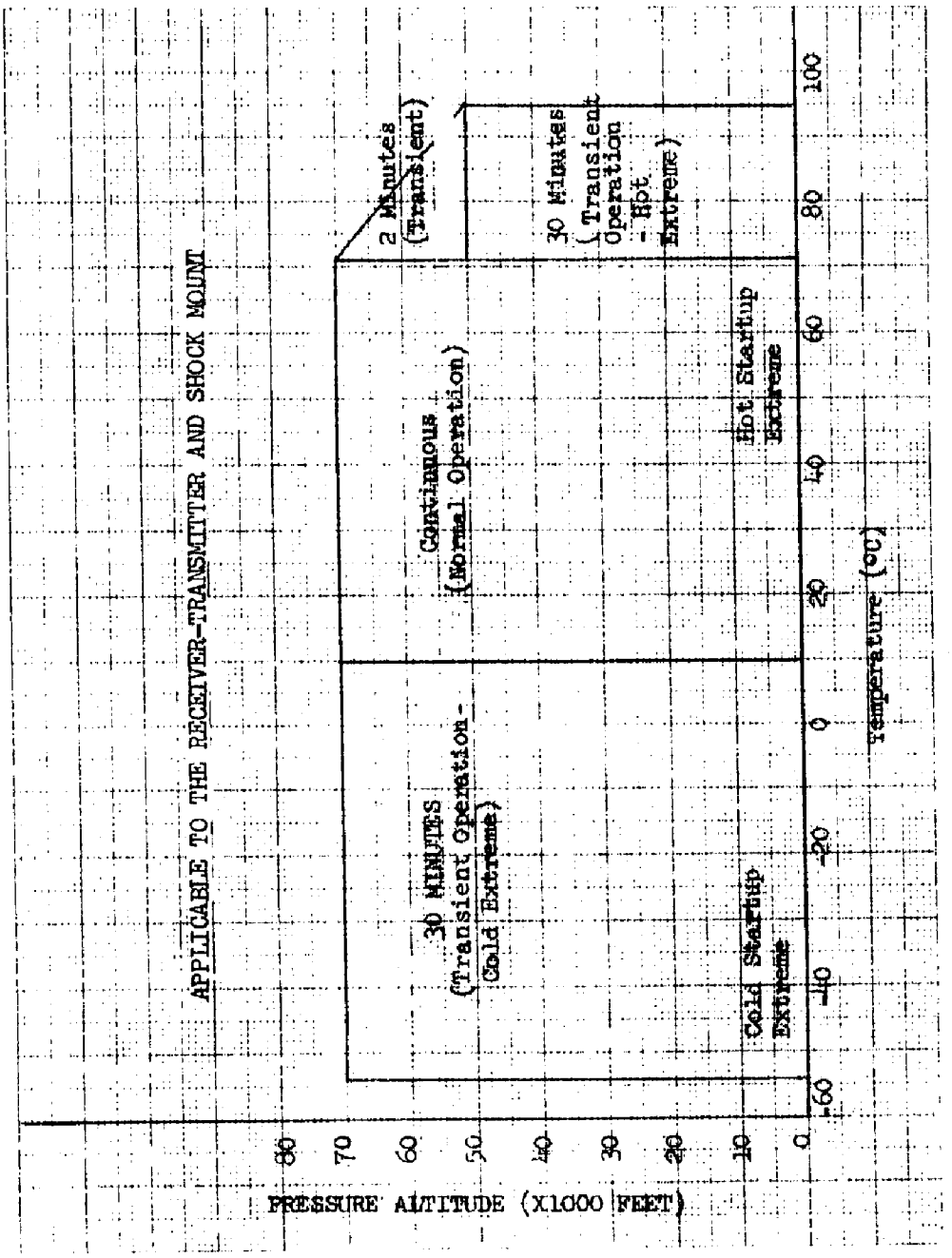
Figure 2

Data Bit Identification Serial Data Train Characteristics

| BIT | FUNCTION | LOGIC LEVEL | DATA(+) | DATA(-) |
|---|---|---|---|---|
| 1 | PRESET CHANNEL 1 OR 11 | NEGATIVE | LO | HI |
| 2 | PRESET CHANNEL 2 OR 12 | NEGATIVE | LO | HI |
| 3 | PRESET CHANNEL 3 OR 13 | NEGATIVE | LO | HI |
| 4 | PRESET CHANNEL 4 OR 14 | NEGATIVE | LO | HI |
| 5 | PRESET CHANNEL 5 OR 15 | NEGATIVE | LO | HI |
| 6 | PRESET CHANNEL 6 OR 16 | NEGATIVE | LO | HI |
| 7 | PRESET CHANNEL 7 OR 17 | NEGATIVE | LO | HI |
| 8 | PRESET CHANNEL 8 OR 18 | NEGATIVE | LO | HI |
| 9 | PRESET CHANNEL 9 OR 19 | NEGATIVE | LO | HI |
| 10 | PRESET CHANNEL 10 OR 20 | NEGATIVE | LO | HI |
| 11 | PRESET CHANNEL 1 THRU 9 and 20 | NEGATIVE | LO | HI |
| 12 | MANUAL MODE | NEGATIVE | LO | HI |
| 13 | GUARD MODE | NEGATIVE | LO | HI |
| 14 | 300 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 15 | 10 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 16 | 20 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 17 | 40 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 18 | 80 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 19 | 1 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 20 | 2 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 21 | 4 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 22 | 8 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 23 | .1 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 24 | .2 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 25 | .4 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 26 | .8 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 27 | .05 MHz FREQUENCY SELECT | POSITIVE | HI | LO |
| 28 | .025 MHz FREQUENCY SELECT | NEGATIVE | LO | HI |
| 29 | WIDE BAND (IF) MODE | NEGATIVE | LO | HI |
| 30 | SQUELCH OFF (RECEIVER NOISE OUT) | NEGATIVE | LO | HI |
| 31 | SPARE (HI) | POSITIVE | HI | LO |
| 32 | SPARE (LO) | POSITIVE | HI | LO |

Figure 3

Data Bit Identification




(U) Figure 4

Temperature Altitude Requirements